

Accelerator Systems Division Highlights Ending May 7, 2004

ASD/LANL: Warm Linac

HIGH-POWER RF (WBS 1.4.1.1)

Accomplishments This Week: Removed 4 Thales 550 kW klystrons from test socket and prepared them for shipment to ORNL. Testing continues on 5 MW Thales tube. Thales is having some difficulties with efficiency and body power on the 5 MW tube currently in factory test. Delivery delay is likely, but it should have no project impact. RF team continued assisting with installations at ORNL. During the past week they worked on installing the CCL-3 klystron.

HIGH-VOLTAGE POWER CONDITIONING (WBS 1.4.1.2)

Accomplishments: Both LANL HVCMs continue to run well, one for the 5-MW klystron tests and one for the 550-kW klystron tests.

PHYSICS & DIAGNOSTICS (WBS 1.4.5)

Accomplishments: (1) *RTBT harp pickup:* We finalized the details regarding the wire connection from the harp cards out to the vacuum feedthroughs and will use solid capton wire. We have completed four high voltage planes, leaving four more to be completed. Macro-Metalics is proceeding on schedule to deliver the harp cards by early June. (2) *RTBT harp electronics:* This past week the harp AFE PCB fabrication job was placed with the vendor with a one-week turn around. The boards are expected at LANL May 11-12. We have ordered the chassis parts and will be assembling these in advance of completing the PCBs. We have also ordered the majority of the parts for assembling the boards, as well as all of the data acquisition hardware and have received order confirmation from National Instruments. As agreed between ORNL and LANL, John Power, the harp electronics engineer will spend 50% time at ORNL until the end of this fiscal year to assist with general diagnostics development and commissioning. While this will introduce a delay in the completion of harp electronics, it will not have an impact on the final RTBH harp system delivery to ORNL.

ASD/JLAB: Cold Linac

Assembly of the H-1 cryomodule is complete. Assembly of the H-3 cryomodule continues. The H-4 string has been handed over for cryomodule assembly.

Processing of fundamental power couplers for the H-5 string is complete. The couplers are being shipped to JLab.

Two cavities are qualified for the H-5 string.

Testing of the M-11 cryomodule continues.

The M-8 cryomodule was shipped to ORNL.

ASD/BNL: Ring

Controls

All three SNS partner laboratories were well represented at the EPICS Collaboration Meeting held this week in Santa Fe. Much of our work was presented and well received. This was the largest collaboration meeting ever (120 people) and demonstrates that the EPICS community is as vital as ever.

At the same time, the controls team participated in the Beam Instrumentation Workshop hosted by SNS in Knoxville.

Mike Thuot visited SNS this week and worked with the Front End Team on noise mitigation issues. Good progress was made in understanding and mitigating some previously intractable sources.

The power monitoring EPICS screens were modified to give Operations additional information. Support was also provided to retrieve archived data to enable detailed studies of power use patterns during the last week of the DTL commissioning run.

All the LLRF sequencers are now running in VxWorks IOC's. All these IOCs (fe-ctl-ioc3, rfq-llrf-ioc, dtl-llrf-ioc [1-6] a, ccl-llrf-ioc [1-2]) are running EPICS R3.14.5.

Installation of cable tray was started in the CLO. While the tray is not actually needed until next FY, it will take less effort if we get it installed before the raised floor is installed.

The CCL 2 RCCS water system was operated this week through the PLC only. The signals and functionality of equipment on the water pump skid (in the klystron gallery) were checked; all went well. The functionality of RCCS DTL 4 and 5 water skids has been checked out. We are now ready to run water through the filter when the mechanical installation is ready. For DTL 6 we are waiting for the pump to be installed. (Recall that DTL 6 pump was borrowed and placed on DTL 2 during this last run cycle). Work remaining includes checking out signals from the beam line interface to the PLC for DTL 4, 5, and 6. We are able to start this work soon now that the shield wall has been removed.

CCL 2 vacuum controls will be checked out after the wiring is complete. The crafts have not started on the wiring from the beam line to the pumps, valve, gauges, etc. at this time. This should be started next week. Then we can proceed with check out.

DTL 5 and 6 were checked out using the test cart a few weeks ago and we did not see any problems. This vacuum test cart is no longer available, so now on we will have to check out the control systems with the actual equipment. We are waiting for DTL 4 beam line wiring to be completed so we can start that checkout.

The last communications cable was installed in the CHL Building. (We were waiting on the 2K cold box control racks to be delivered and installed). All required ICS communications infrastructure is now installed in the CHL Building.

Installation

Craft Snapshot 5/4/04

ASD productive craft workers	61.0
Foremen (Pd by 15% OH)	6.0
AMSI management (Pd directly)	3.0
TOTAL AMSI WORKERS	70.0
Less WBS 1.9, 1.2 etc	5.0
Less absent	3.0
TOTAL PD BY ASD/ORNL DB WPs	53.0

Accelerator Physics

A simulation was carried out to assess the predicted Ring beam-in-gap from 10-4 beam-in-gap delivered from the linac. The ORBIT simulation shows that about 30% of the injected beam in gap remains in the 250 nsec "gap" as specified in the parameter list. This implies that the BIG specification for the ring (of 10^{-4}) could be met if there are no other sources of beam-in-gap from ring beam dynamics not included in the simulation.

Analysis of DTL1-3 commissioning data is in progress, with emphasis on i) comparison of orbit difference data to model, ii) evaluation of MEBT input Twiss parameters from wire scanner data, iii) BPM phase scan analysis for DTL1 phase and amplitude setpoints.

DOE review preparation including dry-runs of 5 AP group presentations.

In applications programming, the “PV logger” is ready for standalone operation, or incorporation into other applications. This program will provide a physics-specific machine snapshot capability for routine capture of machine conditions.

SCL medium-beta cryomodules were sorted for placement in the linac based on cavity and average cryomodule gradients. The assignments have been forwarded to the installation groups.

Operations

Preparing for the DOE Review

Analyzing performance data from DTL 1-3 run

Beginning work on the ARR Post-Start items

Working on SNS Site Power Monitoring and Power Budget Tracking

Interviewed 2 operator candidates

Working on the DataStream implementation

CLO Move Planning

Updating the SNS Master Spares List

Ion Source Group

Preparing for the DOE review, we have studied the data supplied by our archiver team for the DTL1-3 commissioning. There we learned that the Ion source was below 65 kV for about 3 hour before it was noticed and we were informed. The accelerator did not perform properly during these three hours, and therefore the ion-source availability was only 97.8% rather than the previous assessment of 98.9%. On the promising side, the load current started to increase 9 hours before the problem was noted. Implementing the alarm handler will give us in the future enough time to fix the problem before it affects accelerator performance.

The same holds for the steerers, which tripped occasionally unnoted, although the beam was typically reduced by 30%. The alarm handler should fix this problem.

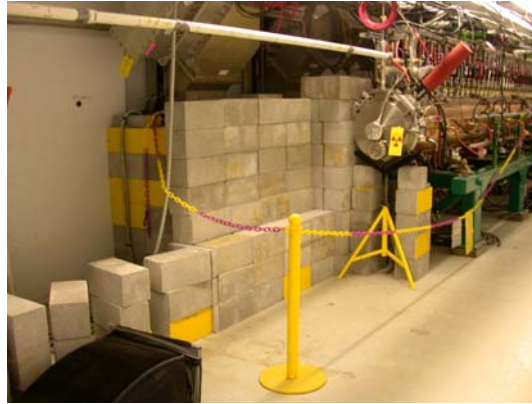
Mike Thuot visited us Tuesday and Wednesday morning and surveyed the front end and the Ion source hot spare stand while the 13 MHz amplifier was generating plasma. He identified a number of emission patterns and left us with a list of about 20 prioritized recommendations that we will implement. We expect these measures to reduce the 13 MHz noise level by about a factor of 10. Special thanks go to Dave Gurd who arranged Mike's visit.

Creative Media Services helped us to prepare a poster on the effect of thresholding emittance data that was presented at the BIW'04.

Survey and Alignment Group

Mechanical Group

We have removed the shielding wall which was downstream of DTL3 including the PPS gate as well as the plug at the entry to the DTL hut. The beamstop used in the commissioning shows only very low levels of activation and has been placed in a controlled area until needed for the next phase.



Final hose connections have been made on tank 5. It is staged in the entry of the DTL Hut so that it can be move into place and bolted down on Monday.



We have attempted to perform the final tuning and iris sizing on tank 6. During the process it was determined that a few Post Couplers would need some minor machining. This is in progress and we hope to it into the tunnel before the end of next week.

CCL-2 tuning was completed this week.

CCL-2 inter-segments have been installed and alignment has begun.

CCL-4 was received at the SNS site and the support frames were set on the beam line.



CCL-4 Support Frames in Tunnel

Water Systems Installation

- The piping from the tunnel waveguide chase to DTL5 & DTL6 manifolds was started.
- The piping from the CCL3 TRCC skid to the CCL3 Klystron continued.
- The feed piping from the CF headers to the SCL5 TRCC skid 10 was started.
- Installation of the piping to the RF equipment on SCL-ME5 and SCL-ME6 continued.

Ring Systems Installation

- The RING Half-Cell #27 (Unit C4) was received and staged in the tunnel.
- The RING Collimator Support assemblies (5) were received and staged in the tunnel.
- The Linac Dump Vacuum Window assembly was installed in the tunnel.
- Termination of magnet cables to the HEBT 12Q45 magnets continued.
- Installation of HEBT Service Building racks continued.

Magnet Task

This week we installed all CCL Module 2 intersegment magnet assemblies.

We mapped two more CCL Quads for Module 3.

We mapped another 8Q35 for a total of five mapped so far.

The design group finished drawings for the 21Q measurement system fix and has sent those out for manufacture.

Electrical Group

HPRF

SCL-2 Electrical connections and grounding completed. AC power to the transmitter. Transmitter checkout next week.

CCL-3 Electrical connections and grounding completed. AC power to the transmitter. Cooling connections remain.

DTL-6 Repaired broken water fitting on DTL6 structure window. Will test for watertight integrity next week.

Safety: Mounted two additional Lock-outs, Tag-out stations to be closer to work being performed.

LLRF

Cryosystem Group

Beam Diagnostics